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ABSTRACT

This practicum addressed the problem of the lack of science instruction in a school consisting of kindergarten through grade 5. The options of teaching science through hands-on activities, use of process skills, adding field experiences and selecting resource persons from the community were presented to the teachers. Appropriate science materials were evaluated by the faculty members. Workshops offering free materials were researched for summer in-service programs. The results of the program indicate that the amount of time for science instruction, number of field experiences, availability of parent resource personnel, and use of varied instructional techniques increased. Teachers, students, and school parents became more aware of the need for science instruction, particularly experiences including ecological concerns. Appended are a curriculum guide, several surveys, evaluation forms, and resource and literature lists. (Author/KR)

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## Implementing an Elementary Science Program Through Community Resources

3301 College Avenue
Fort Lauderdale, Florida 33314
305/475-7300

NOVA UNIVERSITY

SE 051 694

# Implementing an Elementary Science Program Through Community Resources

by

E. Joanne Melody

Cluster XXI

A Practicum II Report Presented to the Ed.D. Program
in Early and Middle Childhood
in Partial Fulfillment of the Requirements
for the Degree of Doctor of Education

NOVA UNIVERSITY

1990

PRACTICUM APPROVAL SHEET

This practicum took place as described.

Verifier: Sue Sipes (signature)
Sue Sipes

Director of Academics
Title

420 West Street Road
Address

Kennett Square, Pennsylvania 19348
City and State

April 1, 1990

This practicum report was submitted by E. Joanne Melody under the direction of the adviser listed below. It was submitted to the Ed.D. Program in Early and Middle Childhood and approved in partial fulfillment of the requirements for the degree of Doctor of Education at Nova University.

Approved:

May 6, 1990
Date of Final Approval of Report

Georgianna Lowen
Georgianna Lowen, Ed.D. Adviser

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## ABSTRACT

Implementing an Elementary Science Program through Community Resources. Melody, E. Joanne, 1990: Practicum Report, Nova University Ed.D. Program in Early and Middle Childhood. Descriptors: Science Education / Process Skills / Field experience / Hands-on-science instruction / science magazines / Earth Day / Science Curriculum content.

This practicum addressed the problem of lack of science instruction in a lower school consisting of four-year-old kindergarten through grade 5. The literature review disclosed adding more time in the daily schedule, using field experience and hands-on instruction with attention given to involving the process skills were viable ways of increasing the teaching of science.

The options of teaching science through hands-on activities, use of process skills, adding field experiences and selecting resource persons from the community were presented to the teachers. Appropriate science materials were evaluated by the faculty members. Workshops offering free materials were researched for summer in-service programs.

The results of the practicum were positive. Amount of time on science instruction, number of field experiences, availability of parent resource personnel, and use of varied techniques including process skills increased. Teachers, students, and school parents became aware of the need for science instruction, particularly that based on ecological concerns.

# CHAPTER I

# INTRODUCTION

## Description of Community

The private school in which this practicum took place is in an essentially rural community strategically placed between two major cities on the eastern coast of the United States. The school is close to a small town of 6,000 which bills itself as "Mushroom Capital of the World" because the major local industry is that of raising and canning mushrooms.

The community has many aspects which make it a desirable place to live. There are several nationally recognized museums featuring art and antiques and renowned botannical gardens. Tourists are attracted to the area because of historical interest in Revolutionary War sites. The area around the school includes some of the best fox hunting country in the United States. Hunting, showing, and 3-day eventing are popular equestrian sports. The school still retains a mounting block from the days when a child might have arrived by horseback, but the block now serves as a base for one of the several sculptures on campus.

While the mushroom industry continues to flourish, the community is feeling the effects of changes and increases in population as banking and corporate headquarters are moving

into a neighboring state and as national industry is relocating nearby. As new job positions open, housing developments are replacing the farmlands. Many upper middle-class families, seeking a pleasant and positive environment, are moving into the area. County planners foresee a large increase in housing within the next 5 years with the potential of doubling the population in the immediate area of the school. Thus, the population of the community is a broad social and economic mixture ranging from Puerto Rican migrant workers, who help in the mushroom industry, to wealthy landowners. In addition, the population now includes many middle-class newcomers.

The school is accepting applicants from families who are experiencing a first introduction to private schooling. Seventy-five percent of applicants to the school are seeking private placement and coming from a public school background.

## The Writer's Work Setting

The school in which this practicum was conducted is an independent nonsectarian coeducational day school which was founded in 1948. By the mid-1970s, the school had completed a building program and raised an endowment of 2.4 million dollars. The annual budget is now 1.25 million dollars and the annual giving goal is $110,000. The median teacher salary is now nearly $20,000 and equals the median range as

described by the National Association of Independent Schools.

Facilities at the school include an academic center which contains classrooms for one section each of grades 2 through 9, the library, and the lunchroom which doubles as a student center. The academic center, completed in 1970, has received a prestigious architectural award and is visited on occasion by building committees from other schools. Other structures on the 17-acre campus include a primary center with classrooms for one section each of preschool for 4-year-olds, kindergarten, and two sections of grade 1, an arts building, an auditorium-gymnasium called "The Barn," and a covered ice rink. The administrative offices are in an 1830's farmhouse in the center of the campus overlooking athletic playing fields. The school has several pieces of significant sculpture on campus and has paintings and art objects of substantial value within the buildings.

The school's enrollment of 220 students come mainly from a 20-mile radius including three counties and a neighboring state. The school seeks a diversity of students from all races and from all socio-economic levels. It supports a strong need-based financial aid program but has not been able to attract a desirable number of minority students. The enrollment has consistently been almost entirely white middle and upper middle-class students.

The school's motto, "Trust, Understanding, and Responsibility," summarizes the belief in the worth of each student as an individual. The instructional programs are planned to incorporate academics, the arts, and athletics in the best balance for each youngster and with the above creed as an unspoken but present fourth element.

At the upper school level, grades 6 through 9, the curriculum includes an academic preparatory program, a developmental program concerned with basic skills, and a third program for children with specific learning disabilities. The school tries to maintain the academic and developmental tracks with about 45% of the enrollment in each and with a 10% enrollment in the learning disability track. Students may be cross-grouped in classes or moved from one track to another. Strengths of the upper school program include offering three foreign languages (French, Latin, and Spanish), drama, art, music, computer science classes, and an athletics program which includes ice hockey and figure skating. Youngsters in the upper school are required to do service in which they help with the maintenance of the buildings and grounds, or community projects.

In grades 8 and 9, students are given an opportunity to travel overseas with recent trips being to China, Japan, Scandinavian countries, Finland, and the Soviet Union. Two Finnish students are generally accepted in the ninth grade

through the Overseas Program. This year the city of Turku, Finland, will host an anniversary celebration in honor of the years of exchange trips with the school.

In the lower school through grade 5, classes are self-contained. Small groupings and individual instruction are used to meet the needs of a wide range of achievers in academics. Three part-time instructors and the writer are available to teach basic skills in small group or individual sessions. The lower school faculty of 17 includes 7 homeroom teachers, the 3 part-time instructors, plus 7 cocurricular teachers.

The librarian is considered an integral part of the lower school faculty and conducts library sessions once a week in kindergarten through grade 5. Homeroom teachers find the art, music, and craft teachers willing to work with any class project, particularly in social studies. Four periods of physical education are held weekly and include ice hockey and figure skating during the winter term. In all, the cocurriculars represent a strongly defined area in the lower school's program of instruction.

Faculty turnover in both full and part-time positions has been low. The teachers like the opportunities offered to seek creative ways of instructing children. The school's faculty fully supports the flexibility within each grade in lower school which can allow students to proceed in

academics at various levels. Teachers are asked to be diagnosticians as they instruct children. Faculty members have had one in-service program in language arts in the past two years. All teachers in lower school meet the requirements for state certification in elementary education. Three hold master's degrees and two others are pursuing master's degrees; one is working towards a doctorate.

The administrative team consists of a headmaster, an assistant headmaster, directors of academics and cocurricular affairs, a director of development, and a director of educational services. The assistant headmaster is also business manager and director of admissions.

## The Writer's Role and Responsibilities

The writer's former responsibility was that of lower school director. The writer worked directly with children, teachers, and parents in the prekindergarten through grade 5. The student body of the lower school includes 130 students. Responsibilities of that position included conducting lower school meetings, arranging in-service sessions, setting up schedules and conferences, obtaining substitute coverage, and being available to teachers for an exchange of ideas.

The writer's responsibility has now been reduced. The writer is responsible for directing the lower school's program for children in need of individual or small-group assistance. The program offers a variety of support activities in reading, spelling, handwriting, and written expression. The writer often works with serious problems in the reading and math areas. The writer is also director of the Country Learning Center, a summer school program focusing on intensive remediation of basic skills. The summer school attracts students from surrounding public schools as well as private schools.

The writer also serves as examiner for early childhood applicants and serves on the admissions committee. The writer also chaired the lower school committee in its preparation for accreditation in 1983 by the State Association for Independent Schools. The writer organized and chaired the group responsible for planning the school's entry into computer use.

In addition to being active in the school for 21 years, the writer has served in several capacities beyond the local level. She has served on two evaluation teams for out-of-state evaluations by the State Independent Schools Association. In 1988, the writer served as vice-chairman of an in-state evaluation team for PAPAS. She chaired the nine liaison meetings in 1982 and 1983 and was responsible for

organizing, setting up programs, and handling communications for the lower schools of the area which were members of the group. Most recently the writer chaired a session at the national meeting of the Orton Society, a group concerned with dsylexia. The writer presently is a board member in a local historical group and also on the educational advisory committee for the local science center.

The writer's background includes an undergraduate degree in early childhood education and a master's degree in reading. She has taught grades 1 through 4 and worked with students through grade 9 in a summer school setting and in private tutorial sessions. The writer has worked with college level students as a supervising teacher for student teachers and with groups of interns completing observations and small group teaching requirements. The most recent experience has been teaching an undergraduate course in primary reading and field experience at an area university. The writer has also had experience conducting educational evaluations and planning individual programs within a private clinical setting. All of the background experience has proved valuable in the writer's present position.

# CHAPTER II

# STUDY OF THE PROBLEM

## Description of the Problem Situation

In the lower school in which this practicum took place, the central focus of the curriculum has been the development of language arts and the mathematics skills. In the last several years more applicants have come to the school with needs in the basics. Thus, the teaching of science particularly was often fitted into the school day in time left over from basic skills teaching.

Each grade, from four-year-old kindergarten through grade 5, had a curriculum plan for science (see Appendix A) but it was not carried out in all grades. Instead, science and related activities depended upon the interest of the individual teachers. The curriculum plan did not have equal emphasis in each grade on varying areas such as physical science, environmental education, and populations.

Textbooks were available in only grades 4 and 5. A health text was also available in grade 4. All texts were outdated. The library had adequate science oriented informational books available to any class. Few science materials were in the classrooms although microscopes could be borrowed from the upper school science laboratory.

Each lower school classroom was originally built with the intention of having a maximum of 16 students. Presently second, third, fourth and fifth grades exceed this maximum. The rooms did not have much space available for learning centers or for keeping ongoing science experiments. Desks, computers, and coat racks took up much space. Students were allowed to use the library into which grades 2 through 4 open, but this did not solve a need for space in setting up experiments, collections, and activities.

The campus consists of 35 acres, and the lower school rooms open up to an outdoor playground with woods. Four picnic tables were available for outdoor experiments, but they were used by only one teacher.

The science program was not being carried out correctly for all youngsters in lower school. If it had been, all teachers would have enjoyed teaching science and would have done so with confidence. Science materials and resources would have been more readily available for all classes. All teachers would have been aware of what science was being taught from grade-to-grade. The time allotted for science would have been used to teach science. Space would have been available for students to have had "hands-on" experiences in a laboratory-type setting.

In conclusion, the problem addressed by this practicum was that science was not being effectively or consistently

taught through the grades of lower school. The lower school students were not receiving a full and rich science program.

## Documentation of the Problem

In order to document the problem stated in the previous section, the writer had asked for the cooperation of the lower school teachers in the school in which the practicum took place. An in-service meeting on needs for science was held. Each teacher was given directions and asked to complete survey sheets (see Appendix B) concerning teaching science concepts.

Discussion of the responses led the teachers to the following conclusions:

1. Science instruction had not necessarily followed the established curriculum. All teachers had taught at least one concept from the curriculum.
2. No teacher had completed the science curriculum for his or her grade level. No one expected to do so in the remainder of the year.
3. Teachers agreed that science was being neglected as a subject. Most teachers felt a lack of time, space, and materials hampered the teaching of science.
4. The majority of science lessons presented appeared to be the lecture-worksheet response type.

Table 1 summarized the results of the survey given to 8 homeroom teachers.

Table 1

Survey of Science Concepts Taught in 1988-89 School Year

| Number of teachers: | Number of Responses |
|---|---|
| planning to complete the curriculum | 0 |
| teaching at least one concept of the curriculum | 8 |
| using audio-visual materials | 7 |
| taking at least one science field trip | 4 |
| using outside resource personnel | 4 |
| using textbooks | 2 |
| using experiments | 5 |
| feel enough time is allotted to science | 0 |

In 1984 the Pennsylvania Association of Private Academic Schools evaluated the school in which this practicum took place. The PAPAS Committee approved of the curriculum, the flexible schedule, and the desire to use outside resources. It was suggested that the school seek space for resources, materials, and classes (see Appendix C) and asked that a human sexuality unit be added to the fifth grade curriculum.

The notes of changes and new activities presented to the Board of Directors included a section documenting science needs (see Appendix D). The section reviewed the need to teach more science in some grades and cited lack of space, equipment, and planning time as negative factors.

The school's Long-Range Plan was developed by the Board of Directors and presented to the faculty in February, 1989 (see Appendix E). The plan charged the school to expand health education and environmental studies. The lower school was specifically asked to promote the use of the scientific method. Thus, the Board of Directors acknowledged some of the needs for improving the lower school science program.

## Analysis of the Causes

The problem of inconsistent and ineffective science teaching in lower school may have had many causes. One cause of the problem may have been the lack of confidence on the part of some teachers about their ability to teach science as a subject. No in-service programs on science have ever been given at the school. Only one teacher in lower school had taken an updated course on the teaching of science in the early and elementary grades. Many teachers were not familiar with the "hands-on" concept of teaching science.

Another possible cause of the problem might have been that currently a number of children were at risk in the basic skills of reading and mathematics. Thus, teachers may have felt more time should be spent on the language arts and mathematics curriculum. Science teaching was relegated to leftover time in the daily schedule.

A third cause of this problem may have been the lack of materials and equipment available to lower school. The lower school had no specific science equipment and had to borrow microscopes, laboratory containers, and needed supplies from upper school. Any texts available were outdated and limited in number.

A related reason for the lack of consistent and effective science teaching in lower school may have been that the school budget provided no direct money for science in the lower school. The budget has been generally aimed for materials in the basic skills of mathematics and reading.

A fifth reason for the problem may have been lack of space within each classroom. Increased enrollment beyond the maximum size of the rooms plus the addition of computers have left little space for setting up labs, exhibits, collections, or learning stations for science activities. Perhaps long-term science projects were too difficult to have been kept in the rooms.

A last reason for the lack of consistent and effective science teaching may have been that science periods were not definitively scheduled into the day. While flexibility of schedules could be considered an asset, science classes were generally omitted when the day was shortened or special programs were presented.

Whatever causes were involved, students in the lower school were not given enough science instruction at this time. Adding an interesting appropriate science program throughout the lower school grades, it was felt, would be an asset both to the students and to the school as a whole.

## The Relationship of the Problem to the Literature

In order to help solve the lack of consistent and ineffective science teaching in lower school, the literature was reviewed, first to see why an increase in science instruction is essential. Konrad Lorenz, a noted scientist, suggests that because of present technology humankind now has the capability of acquiring enormous knowledge. This capability through technology can lead to over-organization and possibly a more programmed behavior in humans with perhaps less personal interchanges with each other. This same capability can become a destructive force because of the lack of attention to the perception of the whole, and to

being sensitive to the harmonies of the world. Lorenz believes the way to counteract the current technological system's negative influence is to let children from an early age on have contact with the natural living world. Thus, humans will be educated to use the enormous amounts of available knowledge toward worthwhile values. (Lorenz, 1983)

Matthew Fox, a spiritual writer, believes that one of the major crises which affects all persons in the same way is the ecological crisis. He feels that science has not succeeded in this century. The reason behind the lack of success has been the separation of religious wisdom from scientific knowledge and power. Fox believes wisdom comes from nature and religious traditions. These two sources of wisdom, nature through science and nature through religious traditions, could be rediscovered, moving humankind to an ecological awareness; then all persons may be said to share creation and understand the true interdependence of all peoples with the earth. (Fox, 1983)

Van der Post (1984) believes humans are out of balance with nature. They must look within themselves to recover the earth, their natural inheritance, and regain a sense of proportion. The earth is being damaged in the meantime.

Schweikert (cited in Fox, 1988), who flew an Apollo Mission in 1969, reports that as he floated in space he realized the compassion he felt for the earth below,

changing his feelings into a maternal energy. Secondly, he realized that political divisions only exist in men's minds. Nature does not recognize nations and Schweikert understood the importance of interdependence of all people and the earth.

Fox (1988) believes the earth is dying. People of the world are not recognizing the interdependence of man and earth; instead the use and misuse of chemical and nuclear accidents, for example, means that humankind is poisoning "the mother of us all" (Fox, 1988, p. 13).

Other scientists also note the destruction of the earth is proceeding at an alarming pace. Shabecoff (1986) reports that species of animals are becoming extinct because of human activity. The rate of extinction is presently as fast as it might have been during some past major geological or climatic upheavals.

Hosmer (1989) states that as rain forests disappear through man's destruction, so do the homes of over half the plants, animals, and insects of the world. Plants which can provide medical benefits for many of today's diseases are becoming extinct.

In addition to the tropical forest, the forests of the United States are disappearing reports Franklin (1989). The United States Forest Service is not acting in the interests of endangered species' habitats or to help the quality of water.

Myers (1989) believes that the global warming, or greenhouse effect, may be the most serious environmental crisis thus far. The effects of the global warming will change the northern forests and cause rising seas which will change wetlands and coral reefs. These environmental changes may force some plants and animals into extinction.

Using an area of land divided into geographical regions with 14 potential ecosystems, a study has been made of changes in the amount of carbon dioxide in the atmosphere (Woodwell et al., 1983). The study's conclusion is that, while the use of fossil fuels is normally thought of as the leading cause of releasing carbon into the air, deforestation is also a significant contributing factor. It appears that forest management and reducing the use of fossil fuels could together reduce the accumulation of carbon dioxide in the atmosphere.

Houghton and Woodwell (1989) confirm that human activities are changing the climate since the 1800's carbon dioxide in the atmosphere has increased by about 25%. Because carbon dioxide and several other gases absorb radiant heat, they can act like the glass in a greenhouse, holding in the heat. The authors' view the deforestation in developing countries as contributing strongly to the greenhouse effect. Houghton and Woodwell support the

cooperation of nations in addressing the problem of deforestation.

Dr. Woodwell (cited in Blaine, 1989), in a lecture at the Stroud Water Research Center, affirmed that 1988 was the warmest year of this century. The five warmest years of this century all occurred in the 1980's. Efforts to stabilize the atmosphere by ending deforestation and limiting the use of fossil fuels should take place as soon as possible. Dr. Woodwell noted that carbon dioxide has accumulated in the atmosphere at a rate 60% greater the last 2 years than in the previous 15 years.

Murphy (1986) reports on a reforestation project by Daniel Janzen of the University of Pennsylvania. Efforts are underway to restore tropical dry forest lands, a nearly extinct ecosystem, in Costa Rica. Thus, one project is being started to counteract in small part some of the deforestation which may be partially responsible for the increasing warm climate.

A review of the literature revealed the past response of education to what was viewed as a crisis in the scientific community. In the 1950's the Soviet Union launched its Sputnik and entered the race for space (Kyle, undated). Educators realized science education in the United States was not keeping pace with that of other nations. Out of this realization came new science curricula

developed by teams that included teachers, scientists, and psychologists, rather than programs developed by one or two authors. Charles and Samples (cited in Kyle, undated) report that the curricula was organized around traditional science courses but attempts were made to find central themes, provide laboratory experiences, and unify ideas within each of the science disciplines. However, the emphasis was on pure science rather than ways of applying the science knowledge.

In the late 1970's, because schools had produced scientists and engineers and the United States had succeeded in landing on the moon first, it was assumed that science education had accomplished its goals. Rutherford (cited in Kyle, undated) believes this assumption led to the lack of interest by the general public in science education and created a second crisis in which government funding supporting science education was withdrawn.

Yager (cited in Kyle, undated) summarized the current crisis in science education. The conditions include the following:

1. Most science teachers work toward the goal of preparing students for the next grade level of science.
2. Over 90% of science educators use a text 95% of the time.

3. Science instruction is rarely being taught through direct experience.

4. Most science teachers use the lecture method and question/answer periods based on the textbook being used.

5. Over 90% of science teachers believe their goals of instruction are tied to specific content and the content is seldom changed.

Goodlad (1954) in his study of schools of the United States found little evidence of instruction beyond the imparting of information; students did not understand the implications of the information and did not explore possible ways of applying it. The above findings were true of science as well as other subject instruction.

Slake and Easley (cited in Kyle, undated) feel science education has been displaced because of the emphasis on "basic skills" teaching. Thus, the programs developed during the 1960's which stressed more "hands-on" and process skills are not being taught.

Yager and Penick (1984) believe both student interest and student achievement in science have been lagging since the late 1960's. They believe science education is in crisis at this time with a need for new goals.

The review of the related literature also revealed some ways current science instruction could be made more relevant

and effective in view of humankind's problems of today. Hurd (cited in Kobella, undated) suggests science curriculum be presented with consideration of societal issues and personal needs. This means students must be aware of problems, understand them, and determine how science is related to those problems.

Hofstein and Tager (1982) believe the science curriculum should focus in on community needs. By using these needs as teaching themes, the content would be relevant but might vary from one area to another.

Koballa (undated) feels the goals for science instruction today must be mixed ones. The curriculum should stress the interdependence of science and society as well as teach science knowledge for personal growth and career development.

Anderson (1983) wants to incorporate problem solving which would involve the use of scientific knowledge into the teaching of science. He also believes science education goals must be determined by getting the public, science teachers, other educators, and scientists to work together.

Kobella and Bethel (undated) believe that science should be integrated into other disciplines, particularly with reading and mathematics. Mathematics in particular has the same goals as science including reasoning and problem-solving skills. Integration of science would help emphasize the interdependence of knowledge.

Bennett (1986) reports science is being short-changed with time particularly in the elementary schools. He recommends science be taught by the classroom teachers, not specialists, to show science is for everyone. A "hands-on" program may be the best and community resources, such as science centers, business and universities, can help with resources. Trying to measure students' attainment in a "hands-on" program is more difficult than with a traditional approach, however.

Kamii and Lee-Katz (1978) state that science is something to be developed as knowledge and as a whole, not as a singular subject. This view agrees with Piagetian theory of letting young children act and react with objects as a way of truly absorbing information.

David Elkind, a noted Piagetian theorist, (cited in Smith, 1982) feels that science instruction in the early years should not include controlled experimentation. Elkind reasons that young children in the preoperational stage cannot consider multiple variables. Smith (1982) recommends observation, classification, and talking to each other in exploratory science activities for the young child.

Gabel (1984) believes students would do better in science courses if they were taught how to read science materials. Science texts should be chosen for the skill level of the students and should include important concepts

and information which is easily understandable (Anderson, et al., 1985). Thelen (1984) considers the textbook a tool. She suggests using various organizational strategies, such as a structured overview, a reading guide, or a concept map to make text information readily understood.

Bennett (1988) wants children to have a basic vocabulary of information in science by the end of third grade. In kindergarten through grade 3, the introduction to science should include such topics as plants and animals, the solar system, weather, rocks and minerals. In grade 4 earth science should be emphasized, while life science should be stressed in grade 5. Practical experiments and demonstrations should show the principles of the scientific method and try to point out science applications.

Graham (1978) indicates library books can be a valuable resource for science. The author found science books were the second most popular category of books checked out.

Lloyd (undated) suggests the use of classroom computers in science instruction. The major advantage of using computers is that students can work with a science concept over and over with no time limits and without the need for constant teacher instruction. Simulations are particularly effective as teaching devices because they give mental experiences of daily life in far less time. The author feels the computer hardware is very good but that instructional software programs have not kept pace.

Kyle (undated) found science teaching was more effective when teachers were encouraged and given support by having science workshops and in-service meetings. The in-service must meet the needs of teachers and be relevant, however.

Squires, Huitt and Segars (1981) believe that improving three student behaviors will improve achievement in science. They would like to see more engaged time on science, or involvement by students; they would like to see more coverage, or amount of content the students handle; they would like to see more success, or how well the students do on science tasks. Fisher, Marliave and Filby (1979) indicate strongly that time for science instruction must be allotted before students can acquire the content, skills, and the ability to apply science knowledge.

Welch (undated) feels science cannot be taught successfully if it is taught just within a classroom; students must participate in many settings such as museums, zoos and out-of-doors. Hartman, Myers and Shapiro (1988) consider nature centers, arboretums, and museums as resources for teaching science and history. The institutional educators can share their expertise using object-oriented learning which complements the curriculum content.

Funk, Fiel, Okey, Jaus and Sprague (1985) postulate three ways science can be taught. One way is to teach the

facts of science. Another is to teach the concepts of science. The third is to teach the processes by which science finds facts. The process approach involves less reading and more doing. By experiencing the "hands-on" approach the students remember the concepts. The authors feel the process skills taught in science carry over into other academic disciplines. For example, the skill of graphing is applicable to mathematics as well as science. Teachers, however, must know the process skills of science before they can teach them to the students.

Gega (1986) stresses the demands society currently places on science instruction. Science education in environmental studies and energy seems imperative with a need to consider career awareness and today's available technology. Since science-related workers will be needed to solve the environmental and energy problems, instruction should be limited to technological applications and thus encourage careers in science for some students.

Moffitt (1984) believes that even block building can contribute to the goals of science education. Block building can be adapted to inquiry processes such as observing, comparing, classifying, and predicting. Young children can learn about the interactions within a system through the normal use of blocks within a classroom.

Sankman (1986) feels an ordinary classroom can be turned into a mini-museum of science exhibits and

activities. For best results, however, the teacher must have student involvement in setting up the exhibits.

Finson and Enochs (1987) relate that students had improved attitudes toward science following visits to science-technology museums. Falk and Balling (1980) feel the novelty of being in new settings on field trips has a positive effect on students' behavior and learning in science.

In conclusion, a review of the literature showed that an increase in science instruction is important because of current ecological problems which are world-wide. The review also revealed how science education has responded to past crises; it must again respond in relation to the new crises. Some specific suggestions for improving science instruction are found in the literature.

# CHAPTER III

# ANTICIPATED OUTCOMES AND EVALUATION INSTRUMENTS

## Goals and Expectations

Science instruction was considered important for the students in lower school, not only for the present but for the future as these same students become involved citizens responding to environmental crises in the world. As a result, the goal of this practicum was to improve the teaching of science throughout the lower school.

## Behavioral Expectations

The literature review concerning the improvement of science education showed methods by which instructional time for science could be increased. The first behavioral objective addressed this issue. The second behavioral objective addressed adding alternative science methods to science instruction as suggested by a review of the literature. The third behavioral objective addressed community involvement in the teaching of science as advised in the literature review. The fourth behavioral objective

was to increase the interest in science studies in the school community of parents and teachers, a concern reflected in the review of the literature. The following behavorial objectives were selected for this practicum:

1. Over a period of 8 months, the amount of time allotted to the teaching of science will increase at all grade levels in lower school.
2. Over a period of 8 months, the lower school teachers will add additional science materials, methods and resources, including field experiences appropriate to the various grade levels, to the curriculum at each grade level.
3. Over a period of 8 months, community personnel--particularly school parents--will be involved in the teaching of science as resource personnel.
4. Over a period of 8 months, interest in science will increase as shown by the number of science-related books checked out of the library by students and teachers.

## Standards of Performance

The following standards of performance were used to measure behavioral expectations:

1. At the end of the 8-month period, when presented with the post-survey on the amount of teaching time devoted to science, the teachers will indicate at least a 15% increase.
2. At the end of the 8-month period when presented with the post-checklist regarding alternative science methods, resources, and field experiences, the teachers will indicate a 15% increase in these processes being used.
3. At the end of the 8-month period when the post-survey of outside personnel is completed, there will be a 15% increase in the number of resource personnel available to classrooms.
4. At the end of the 8-month period, the number of science-related books checked out of the library will have increased at least 15%.

## Assessment Instruments

The following assessment instruments were used to measure the standards of performance:

1. At the end of the 8-month period, the teachers will repeat a survey on the amount of time given to teaching science. The results of the survey, which will also be given before the practicum is implemented, will be compared (see Appendix G).

2. At the end of the 8-month period, teachers will repeat the checklist, given before the practicum was implemented, on methods used to teach science (see Appendix B). The results will be compared.

3. At the end of the 8-month period, teachers will repeat the survey listing community personnel involved in the teaching of science. The results will be compared to the same survey given before the practicum was implemented.

4. At the end of the 8-month period, the book tally for the final month of science-related books checked out of the school library will be compared with the book tally of the first month of the practicum implementation.

A log was to be kept to record unexpected events which happened during the implementation of this practicum. These events would include unexpected deviations from the original plans and differences resulting from problems during implementation.

# CHAPTER IV

# SOLUTION STRATEGY

## Discussion and Evaluation of Solutions

A review of the literature shows that current ecological problems exist on a world-wide scale. Van der Post (1984), Fox (1983), Lorenz (1984), and Schweikert (cited in Fox, 1988) all believe in the interdependence of the earth and humankind. These authors believe the earth is being severely damaged because the interdependence is not being recognized.

Shabecoff (1986), Hosmer (1989), Franklin (1989) and Myers (1989) believe that plants and animals are being forced into extinction because of humankinds' misuse of the earth. One specific world-wide problem contributing to the potential loss of plants and animals through extinction is that of global warming as reported by Myers (1989), Houghton and Woodwell (1989), and Woodwell et al. (1983). Franklin (1989) and Woodwell (cited in Blaine, 1989) agree that deforestation is one cause of global warming and Murphy (1986) reports on one project in Costa Rica which is attempting to reverse deforestation. The world-wide ecological problems created by man are the crises needing to be addressed immediately by science and technology.

The literature also revealed how science education in the past responded to a national crisis. Kyle (undated) and Charles and Samples (cited in Kyle, undated) report on the changes in the teaching of science in the United States following the launching of Sputnik in the Soviet Union. Educators developed science programs which, while still following the traditional science disciplines, such as biology and botany, did provide unifying themes, more laboratory experiences and "hands-on" activities. The emphasis was on pure science, however, with less emphasis on applications.

This lag in science and technology of the late 1950's and 1960's was assumed to be solved by the 1970's because of the increased number of scientists and engineers entering the work force. Rutherford (cited in Kyle, undated) feels this assumption resulted in lack of funding by the government for science education.

Consequently, science instruction appears to be facing a new crisis. Goodlad (1984), Stake and Easley (cited in Kyle, undated), and Yager and Penick (1984) state that science instruction is in need of new goals and new teaching methods. Lorenz (1983), Fox (1983), and Van der Post (1984) would agree that among the new goals one must include promoting ecological awareness and the interdependence of

the earth and humankind; such a goal would transcend political boundaries and view countries as sharing one earth.

The solutions presented in the literature in response to the need for a change in the kind of science instruction were varied. Some authorities sense the need to involve children at a young age. Lorenz (1983) suggests that children have contact from an early age on with the natural living world. Kamii and Lee-Katz (1978), Moffitt (1984), Smith (1982), and Elkind (cited in Smith, 1982) would limit the science instruction to observation and exploration activities in the very early grades. Bennett (1988) feels science instruction through grade 3 should be considered an introduction but students by the end of grade 3 should have a basic knowledge of science vocabulary.

Authorities suggest that science content may be approached in different ways. Kobella and Bethel (undated) want science instruction integrated into other disciplines agreeing with Goodlad (1984) who feels too much current science instruction is that of giving out facts instead of recognizing the implications of the content and finding ways to apply those implications. Anderson (1983), Gega (1986), and Bennett (1988) also approve of teaching the applications of science.

Bennett (1986), Funk, Fiel, Okey, Jaus and Sprague (1985) and Hartman, Myers and Shapiro (1988) want a "hands-on" approach used; children remember the concepts in an object-oriented learning situation. Some authorities believe that science should be taught through the inquiry processes. Funk, Fiel, Okey, Jaus, and Sprague (1985) feel by the processes used in science such as observation, classification, and comparison, there will be a carryover in using the skills in other subjects. Moffitt (1984) agrees that even young children can use the process skills such as comparing, classifying, observing, and making predictions.

Hartman, Myers, and Shapiro (1988) and Bennett (1986) consider outside resources as valuable in teaching science. Nature centers, arboretums, museums, zoos, and the out-of-doors are available and allow student participation in meaningful situations (Welch, undated). Falk and Balling (1980) and Finson and Enochs (1987) relate that field trips promote better attitudes toward science by the students and have positive effects on learning. Hofstein and Yager (1982) would choose teaching themes based on community needs making the teaching of science relevant to the surroundings.

Many authorities recommend the use of science texts but place certain restrictions on their use. Thelen (1984) considers the text a tool but suggests using organizational strategies, such as concept maps, to help students understand the material. Gabel (1984) wants students to

have training in how to read science texts while Anderson et al. (1985) believes science texts should be carefully selected for the skill level of the students and have important concepts presented in easily understandable ways.

Graham (1978) found that library books which were science-related could be a valuable resource for teaching. Lloyd (undated) feels computers and software have advantages in science instruction, particularly in the use of simulations, but that software needs continued development and refinement to make the most effective teaching tool.

Hurd (cited in Kobella, undated) and Hofstein and Yager (1982) believe needs of the society or community should be included in science instruction. Thus both writers would probably approve the use of community personnel in complementing classroom instruction. Working with the community needs could be the beginning of students' awareness of world-wide needs as described by Shabecoff (1986), Hosmer (1989), and Myers (1989).

The literature review also pointed out that authorities value the classroom teacher as the appropriate elementary science instructor. Bennett (1986) recommends the classroom teacher rather than a science specialist to show that science is for everyone. Sankman (1986) feels the classroom teacher can organize the classroom, with student involvement, into a mini-museum of science exhibits.

Kobella and Bethel (undated) would agree that the classroom teacher could most easily integrate science into other disciplines. Kyle (undated) found classroom teachers taught science more effectively when given relevant in-service training. Funk, Fiel, Okey, Jaus, and Sprague (1985) feel teachers must have training in the use of the process skills of science (observation, classification, measuring, communication, inference, experimentation). Hartman, Myers and Shapiro (1988) recognize that resource personnel at various field trip sites will have expertise which can implement the classroom teacher's instruction.

The study of the literature points out that one specific method of improving the teaching of science would be to add more time for instruction. Squires, Huitt and Segar (1981) and Fisher, Marliave and Felby (1979) would like to see more time spent on instruction. The time for teaching science must be allotted before results are seen in terms of students' absorbing and applying the content. The literature review also implies that the study of ecology would be appropriate as a theme in science instruction because of increasing world-wide environmental problems.

Thus, the review of the related literature points out important elements in strengthening science instruction to meet the needs of today's students who will be future citizens determining how to handle world environmental and other science-related problems. Two elements reported in

the literature fit into the needs of the lower school in which this practicum will take place. First, the elementary homeroom teachers will be regarded as the science teachers. Next, it is important to create an atmosphere in which more time will be spent on science by the teachers as their own choice.

The first solution suggested by the literature which would help get teachers interested in science is the use of field experiences related to science content. The next two solutions which the literature review suggests are valuable and which may work in the school are training in the use of "hands-on" science approaches and learning the process skills involved in teaching science; in-service workshops would be feasible for the lower school faculty.

The literature indicates that involving community personnel and field-site personnel provides increased support for the homeroom teachers as they work with science. This solution is most appropriate for the school in which this practicum will take place because of the abundance of potential field sites and the number of parents who can provide assistance. An initial list includes 21 museums, nature centers and other sites (see Appendix F).

Obtaining texts does not seem to be as important to science authorities as using any text correctly. Thus, the literature suggests that useful and appropriate materials be

researched rather than adopting one standard text throughout lower school. Curriculum committees meeting this year include one on science; the issue of texts and whether to use them will be left to the science committee and not be covered within the framework of this practicum. Instead, easy-to-use and appropriate materials will be researched for possible application in various grades.

## Description of Selected Solution

The selected solution to improving the teaching of science in the lower school involved several interrelated strategies. As an introduction, at a regular assembly period, the need to teach science using an ecology-based format was promoted through a program in which the important statements concerned the interdependence of man and the earth and a description of a specific event which indicates a lack of balance. This event concerned the disappearance of butterflies this season. Students and teachers were asked to discuss possible reasons for the disappearance when they returned to the homerooms.

Faculty were asked to respond to surveys concerning the amount of time spent teaching science (see Appendix G), knowledge of the process skills (see Appendix H) and teaching competencies and interests (see Appendix I). These surveys were repeated at the close of the practicum implementation.

The practicum implementation was divided into two sections. The first concerned preparing the teachers for using field site experiences, "hands-on" experience and process teaching. The following strategies were carried out during the first part of the practicum.

The closest nature center was visited by the lower school faculty at one of the regularly scheduled meetings. The facilities were inspected and a discussion held with the assistance of the director of the center concerning what science instruction should be at an elementary level. It was expected that the "hands-on" approach would be shared.

The next step included reviewing field site possibilities for science. Nature center directors, faculty, and neighboring school personnel were consulted to add additional sites to the initial list (see Appendix F). Individual teachers were then encouraged to preview sites appropriate for their grade levels.

Using information sheets available from application forms for school entrance, a list of parents with scientific

backgrounds, interests, and occupations was completed. This list was shared with faculty for possible use. The possibility of getting donations of science materials was also explored.

Recently one lower school teacher received a scholarship to attend a course on teaching elementary science through process skills. This teacher was asked to share his knowledge from this course with his fellow lower school teachers. This workshop included determining what process skills are applicable for specific grade levels.

The second part of the practicum included working with faculty in determining what field site experiences are appropriate and arranging the trips. Faculty members were asked to evaluate field trips with the criteria of content, distance, appropriateness of the facility, and expertise of the personnel (see Appendix J).

Local science educators were consulted for suggestions about easy-to-use and appropriate science activities for use in limited classroom space. These materials, once determined, were presented to the science curriculum committee and discussion was held on appropriate levels for use. The faculty was asked to evaluate any materials used within the classroom setting (see Appendix K). Textbooks were not included in materials as defined by this practicum,

but kits, library books, and sets of materials considered as "hands-on" were considered.

As a method of measuring interest in science, a record of science-related library books checked out was kept beginning with the first month of the practicum implementation. This was compared with later counts of science related books checked out of the library. The records indicated teacher as well as student participation and required the cooperation of the school librarian.

Adding field experiences and resource personnel, seeking new materials and using "hands-on" and/or process experiences combined to make science more appealing and interesting to both teachers and students. Science is now being taught in a more consistent and effective manner. The solution was one which did not require spending extra funds on materials. The strategies selected involved student participation, teacher and community involvement, all advantages which make science instruction meaningful.

## Report of Action Taken

A school assembly, stressing interdependence of man and the earth, was held as an introduction to the emphasis on science activities. The headmaster had set up faculty curriculum committees and included one on science with both upper and lower school teachers as members. The first

strategy consisted of having an after school meeting at the closest nature center. The education director of the center led a discussion of how science classes, particularly in the lower grades, should use appropriate "hands-on" procedures and involve process skills in the instruction. The actual content of the curriculum at each grade level was considered less important than the involvement of the process skills which could then be applied to any science content. An awareness of the programs available at the nearest community nature center came about following the faculty visit to the center. Teachers then began to automatically search for programs at the center which would be helpful in their science units (see Appendix U).

The second strategy, reviewing field site possibilities, was handled in several ways. The writer made the initial visit to some sites and was at times accompanied by a teacher who planned to use the site. With some sites a teacher made the initial contact following information given to her. Teachers were asked to fill in the field site evaluation form (see Appendix J). Sixteen of the possible sites listed in Appendix F were visited and evaluated. Three of the sites were eliminated from possible use because of the distance from the school. Two sites were eliminated from the list because the programs did not appear suitable for lower school children. Because the closest nature center was within three miles of the school, programs there

were considered important possibilities for use in the curriculum. Of the 21 sites, 16 were considered as appropriate for various grade levels in the teaching of science in the lower school with two new sites added to the list (see Appendix L).

The third strategy in using outside resources to teach science in the lower school involved listing personnel available from the parent body and from the school faculty. The list included 34 possible experts in various fields of science. Fifteen of these persons were used as resource personnel during the time frame of this practicum.

The fourth strategy, holding a meeting in which the use of process skills in the teaching of science was discussed, was held in the seventh month of the practicum's time frame rather than in the second month. This change came about because the science curriculum committee elected to obtain the services of an outside science professor at a local university. The speaker indicated that all process skills can be used at all grade levels in the teaching of science but that the skills of observation, measurement, and communication are particularly important at the early ages with "hands-on" activities being the key to successful experiences.

The fifth strategy consisted of contacting science educators and representatives of science curriculum

materials for suggestions as to appropriate programs for lower school science. Because of the parent interest in increasing science instruction, the parent organization elected to give money from fund-raising efforts to purchase science materials; thus more money was available than had originally been anticipated. The Kids Network Program, a telecommunication science program developed by the National Science Foundation and the National Geographic, was presented to the science curriculum committee and the parents' association by the writer. The program was immediately accepted by both and purchased with parent organization funds. The first introductory unit called "Hello" was used by the fifth grade in the sixth and seventh month of the practicum. It is expected that the unit will be a part of the grade 5 science curriculum from now on and that the second unit, "Acid Rain," will be used with the sixth grade within the next school year.

The inclusion of the Kids Network Program by National Geographic has brought telecommunication to the school. The use of telecommunication in other areas is foreseen. Two concepts about science were established through the use of the Kids Network. First, was that of the awareness of the world as a community; and second, was that of scientific applications of the use of telecommunications in sharing scientific results quickly and efficiently.

The school library, regarded as an excellent source of materials because of the number of science-related books, was surveyed to see how many science magazines were available (see Appendix M). A list of other potential science magazines was made and presented to the librarian (see Appendix N). In all, the writer made 22 personal contacts which brought specific useful information on science programs available and provided a networking situation for the school in regard to Earth Day activities as well (see Appendix O).

The celebration of Earth Week created an opportunity to put some science applications into practice. The writer coordinated The Earth Week plans in which students, teachers, and parents participated in various ecology-based events. Science, social studies, and English classes worked together to raise awareness of how to lobby for environmental issues, for example. Science classes studied the issues, the social studies classes worked with a representative from the League of Women Voters in determining how to lobby issues, and the English classes wrote letters to appropriate legislators (see Appendix T).

Planning for Earth Week also helped the writer locate three science programs which give free teaching materials during workshops held for teachers (see Appendix R). Planning for Earth Week also led to involvement in the

Council of the Earth Program in which art, Indian lore, and ecological awareness are combined (see Appendix Q).

Selected materials were tried and evaluated by teachers using the evaluation form for science materials (see Appendix K). As teachers evaluated materials, they realized the importance of hands-on activities and interesting content in lower school science. Not all potential materials have been placed in classrooms because the science committee has not completed its curriculum statements and because some programs cannot be used until training workshops are held.

The writer attended a workshop sponsored by the County Intermediate Unit concerning how to set up science fairs at the local school level with the possibilities of continuing into the county level. The writer then did a similar short workshop with members of the science curriculum committee. Again, teachers were made aware of a community resource available to all schools.

Several additional factors contributed in bringing forth an awareness of science and its importance in the curriculum. The science curriculum committee interviewed the homeroom teachers extensively regarding the needs, the content, and the materials available in text form. Also, the parent organization wanted funds raised through organization efforts to be allocated to science.

# CHAPTER V

# RESULTS, CONCLUSIONS, AND RECOMMENDATIONS

## Results

Objective one, "over a period of 8 months, the amount of time allotted to the teaching of science will increase at all grade levels in lower school" was measured by comparing the results of a teacher survey on amount of science instruction time. The survey was given before and at the close of the practicum implementation (see Appendix G).

All classes, except the 4-year-old kindergarten, increased the amount of time spent on science by more than the 15% criteria. The fifth grade actually doubled the amount of time on science and the second grade's large increase came about because of additional science units added to the curriculum. It is felt a recent increase in the length of the lower school day allowed for more science instruction time. Available teaching time for scheduling totaled 2 hours and 20 minutes a week. Table 2 summarizes the amount of inceased time spent on science instruction.

Table 2

Increase in Science Teaching Time

| | |
|---|---|
| Kindergarten (4-year-olds) | No increase |
| Kindergarten ( 5-year-olds) | 33% increase |
| Grade 1 | 33% increase |
| Grade 2 | 50% increase |
| Grade 3 | 17% increase |
| Grade 4 | 33% increase |
| Grade 5 | 100% increase |

The second objective was that, "over a period of 8 months, the lower school teachers will add additional science materials, methods (teaching with the process skills), and resources including field experiences appropriate to the various grade levels to the curriculum at each grade level." Teachers in lower school felt aware of using the process skills during the teaching of science according to the pre- and post-survey. Increases ranged from 13% to 60% with the grade 3 teacher remaining consistent in her use of 8 process skills. It is suggested that the increase may be one of awareness of the use of the process technique. When considered overall, the lower school met the 15% criteria for increasing the use of process skills. Table 3 summarizes the results.

Table 3

Increases in the Use of Process Skills

| | |
|---|---|
| Kindergarten (Four-year-olds) | 50% increase |
| Kindergarten (Five-year-olds) | 13% increase |
| Grade 1 | 13% increase |
| Grade 2 | 40% increase |
| Grade 3 | Remained the same |
| Grade 4 | 13% increase |
| Grade 5 | 60% increase |

The lower school visited 12 additional field sites during the implementation of this practicum (see Appendix P). All grades, except first, increased the visits. First grade, divided into two sections this year, did not feel the groups were able to handle trips until quite late in the year. The increase in the number of field site experiences met the 15% criteria established. Table 4 summarizes the number of previous trips from last year and indicates the number of new field site experiences added.

Table 4

Comparison of Number of Field Site Experiences

| | Previous Trips | Added Trips |
|---|---|---|
| Kindergarten (4-year-olds) | 2 | 1 |
| Kindergarten (5-year-olds) | 1 | 1 |
| Grade 1 | 2 | None added |
| Grade 2 | 1 | 1 |
| Grade 3 | 2 | 2 |
| Grade 4 | 4 | 4 |
| Grade 5 | 2 | 3 |

Science materials, excluding texts, were given to teachers for evaluation during the practicum period (see Appendix K). Teachers responded positively and used the materials presented to them. Since few materials were previously available, their distribution can be said to have met the 15% criteria in the increase in use of materials. The programs selected and the appropriate grade levels are given in Appendix Q. Although additional science programs have been selected for presentation, the science curriculum committee needed to complete the course content at various levels before approving the programs (see Appendix R).

The third objective, "over a period of 8 months, community personnel, particularly school parents, will be involved in the teaching of science as resource persons," was measured by comparing a pre- and post-survey listing available persons. Fifteen people were on the original list compared to 35 resource persons on the final list, well above the 15% criteria for increase in numbers (see Appendix S).

The final objective, "over a period of 8 months, interest in science will increase as shown by the number of science-related books checked out of the library by students and teachers," was measured by comparing a book tally from the first month of the practicum's implementation to a book tally during the last month. The amount of increase surpassed the 15% criteria. Books checked out in fall in general were more animal-related while the last book tally reflected a wider spectrum of science interests such as dinosaurs, the universe and space, weather, plus animal books.

Grades 4 and 5 checked out more science books than the kindergartens through grade 3. The fourth grade and the five-year-old kindergarten teachers checked out more science books in both the fall and spring than teachers of other grades. Table 5 presents the comparisons of the book tally.

Table 5

Book Tally Comparisons

| | Fall | Spring |
|---|---|---|
| Students | 30 | 41 |
| Teachers | 8 | 26 |

## Conclusions

The first objective of this practicum concerned the amount of teaching time given to science. The second objective involved increasing science materials, methods, and field experiences. The third objective concerned increasing the number of resource persons available. These three objectives were clearly met as shown by the data in the previous section. The last objective involved increasing interest in science. It is felt that the book tally, although a succcessful indicator of having met the objective of increasing interest in science, does not adequately show the amount of interest in science expressed by teachers, parents, and children during this practicum's implementation.

A survey by the science curriculum committee suggests that lower school faculty members are now giving no more than 50% of the time to the lecture-worksheet method of

instruction. The science committee is attempting to establish broad areas of instruction without being too specific in terms of content for each grade level, a system which should encourage innovativeness on the part of the homeroom teachers since they will have input on the content. Teachers at various grade levels are more aware of what is being taught at all grade levels. Occasional cross-grading has been used to complete some science activities, and this is being encouraged when the activities are appropriate.

Workshops on campus for the three programs which offer free materials will be planned for the summer and will include invitations for other schools to send teachers. One particular set of commercial materials, the Full Option Science System, developed by the Lawrence Hall of Science at the University of California (see Appendix R), is in trial edition at this time. The materials appear appropriate for the lower school because hands-on, flexible activities based on stages of development in varying grade levels are included in this program. Sample materials and a consultant will be available to help present this program to the science curriculum committee when it is ready to examine more materials.

Faculty in lower school expressed appreciation for the addition of science materials such as the AIMS projects (See Appendix Q). This material clearly indicates what skills and processes are being used while specific science projects

are being conducted. Homeroom teachers' level of confidence concerning the teaching of science appears to have increased, and they have acquired a willingness to try new methods and seek new field experiences.

Parents, as well as faculty, responded positively to becoming part of the resource personnel pool. During Earth Week planning sessions, parents volunteered to read to classes using ecologically-oriented stories. Parents also helped with tree planting and trash walk activities. The parent organization sponsored a salad bar lunch for the whole school. Parents attended both Earth Week assemblies. One parent remarked that the sense of community had returned to the school. She hoped that more activities such as those planned for Earth Week could be continued on a school-wide basis.

Consultants who helped with locating materials and speaking on science curriculum felt that the school, with its acres of open space, could lead in promoting hands-on science whether or not commercial materials were purchased. The consultants were willing to come for further in-service if requested because they could see potential.

Students responded positively to the added field experiences and the addition of more science time which included more hands-on activities. Students are aware of local ecological concerns; one child's contribution to the final Earth Day assembly describes this awareness. A

five-year-old climbed on a chair and announced that she and her mother were upset because another big group of houses was being built right next to the children's play area where she lived. Awareness of local issues is a first step in helping youngsters become future concerned citizens.

## Recommendations

The writer has some recommendations based on the outcome of this practicum. The awareness of the importance of science in the lower grades is at its height in the school in which this practicum took place. The importance of science instruction in the elementary grades is also once again receiving national attention as shown by an article in Newsweek in which Begley, Springer, Hager, Barratt, and Joseph (1990) conclude that science instruction today needs to use strategies which include teaching for depth and thinking. The next decade will likely be one in which environmental issues are of local, national, and international concern. Therefore, timing is good for instituting a science curriculum which uses hands-on, in-depth, and relevant content. It is suggested that a commercial program, such as the Full Option Science System (see Appendix K) be funded and used preferably in place of text teaching. While such a program is expensive, its

advantage is in the amount of equipment and materials available. It is important that the homeroom teacher, who is familiar with the developmental levels of that particular grade, continue to teach science. A commercial program, such as the Full Option Science System, would have complete materials and instructions and could be effective in a small classroom setting in which groups of three or four students could conduct experiments. Parents should be involved in looking at such a commercial program so full school support would be assured. While the homeroom teacher would teach science, it is suggested that one teacher be designated as science coordinator. The science coordinator could then be responsible for material replacements and help set up experiments for teaching sessions.

The workshops which can be scheduled for the summer (see Appendix R) will provide an excellent opportunity for promoting the campus. It is feasible to invite other school faculty members to participate in these workshops. It would benefit the school in which this practicum took place to ask interested parents to attend these same workshops. A parent representative who is enthusiastic will return to the parent organization and share that the school needs new science material.

It is also suggested that holding a science fair next year will maintain an image of a strong committment to

science by the lower school. All the material for organizing such a fair is ready for use.

At the beginning of next year, the list of parent resource persons should be reviewed. Any new parents with an expertise in science should be added.

Getting press coverage for any of the new programs, such as the Kids Network by National Geographic, is also considered essential. Innovative and successful programs bring a natural public relations flow from the school which will encourage parent participation and possible financial donations for future programs.

A workshop on cooperative learning techniques is suggested as an in-service program for the near future. Some science programs are incorporating the idea of collaborative learning into the hands-on activities, particularly above the third grade level. Cooperative learning can be used in any academic discipline and thus it would be useful to train teachers in the technique.

During the implementation of this practicum, the offer of additional classroom space came from a parent. The building, a former dairy, borders on a portion of the land owned by a conservancy. The conservancy land includes a stream and diverse areas of ecological interest. The conservancy director feels the land could be used as a resource. The building could become a science laboratory in which week-long sessions of environmentally-based science

instruction could take place. Exploring this alternative and continuing to build a science curriculum based on applications could produce a truly unique program.

## Dissemination

The results of this practicum will be shared first with lower school faculty members and then with the science curriculum committee. During the proposed summer workshops, some of the materials researched for the practicum will be shared with teachers from other schools.

A news release was sent to a local newspaper on the school's Earth Week activities (see Appendix V). The National Geographic Kids Network Program will also be featured in the local newspaper because of the efforts of the writer and the school's director of development. An article about the Kids Network which appeared in the school magazine will be sent to the National Geographic. Perhaps quotes from the article can be used in the "Hello" brochures describing the program.

## REFERENCES


Anderson, R. C., Hiebert, E., Scott, J. & Wilkinson, I. (1985) Becoming A Nation of Readers (pp. 69-71). Washington, DC: The National Institute of Education.

Anderson, R. D. (1983). Are yesterday's goals adequate for tomorrow? Science Education, 67, 171-176.

Begley, S., Springer, K., Hager, M., Barratt, T., Joseph, N. (1990, April 9). Rx for learning. Newsweek, 55-64.

Bennett, W. J. (1986). First lessons: A report on elementary education in America. Washington, DC: United States Department of Education, 27-28.

Bennett, W. (1988). James Madison elementary school A curriculum for American students (pp 11, 39-42). Washington, DC: United States Department of Education.

Blaine, J. G., (1989, May 11). Greenhouse effect is physical fact, scientist says. The Kennett Paper, p. 15.

Falk, J., & Balling, J. (1980). The school field trip: where you go makes the difference. Science and children, 17, 6-8.

Finson, K., & Enochs, L. (1987). Student attitudes toward science-technology-society resulting from visitation to a science-technology museum. Journal of Research in Science Teaching 24, 593-609.

Fisher, C., Marliave, R. & Filby, N. (1979). Improving teaching by increasing "academic learning time." Educational Leadership, 37, 52-54.

Fox, M. (1983). Original Blessing. (pp. 12-14, 254). Santa Fe, NM: Bear & Company.

Fox, M. (1988). The Coming of The Cosmic Christ (pp. 13-15, 32-33). San Francisco: Harper & Row.

Franklin, K. (1989, May/June). Deforestation hits home: U.S. Forest Service levels our landscape. Utne Reader, p. 52.

Funk, H., Fiel, R., Okey, J., Jaus, H. & Sprague, C. (1985). Learning science process skills. (pp. xi-xiii). Dubuque, IA: Kendall Hunt Publishing Co.

Gabel, D. (1984) An exchange of views on the place of reading in science instruction. Journal of Reading, 27, 585.

Gega, P. (1986). Science in elementary education (5th ed.). (pp. 6-9). New York: MacMillan.

Goodlad, J. I. (1984). A place called school: Prospects for the future. New York: McGraw-Hill Book Company.

Graham, S. B. (1978). Do children read science books? Science and children, 15: 29.

Hartman, L., Myers, E., Shapiro, C. (1988). Beyond the blackboard: A guide to regional museum resources (p xi). Philadelphia, PA: The Museum Council of Philadelphia and the Delaware Valley.

Hofstein, A. & Yager, R. E. (1982). Societal issues as organizers for science education in the 80's. School Science and Mathematics, 82., 539-547.

Hosmer, E. (1989, May/June). What we're losing as rain forests disappear. Utne Reader, p 50.

Houghton, R. A. & Woodwell, G. M., (1989). Global climatic change. Scientific American, 260, 36-44.

Kamii, C. & Lee-Katz, L. (1978). Physics in preschool education. In J. F. Brown (Ed.), Curriculum planning for young children (pp 171-175). Washington, DC: National Association for the Education of Young Children.

Koballa, T. (undated). Goals of science education. In D. Holdzkom & P. Lutz (Eds.), Research within reach: science education (pp. 25-36). Washington, DC: National Institute of Education.

Koballa, T. & Bethel, L. (undated). Is there a relationship between science and other subjects taught in schools? In D. Holdzkom and P. Lutz (Eds.), Research within reach: science education (pp. 83-98). Washington, DC: National Institute of Education.

Kyle, W. (undated). Curriculum development projects of the 1960's. In D. Holdzkom & P. Lutz (Eds.), Research within reach: science education (pp. 3-24). Washington, DC: National Institute of Education.

Kyle, W. C. (undated). Influence of home factors in learning. In D. Holdzkom & P. Lutz (Eds.), Research within reach: science education (pp. 125-126). Washington, DC: National Institute of Education.

Lloyd, L. (undated). Computers and science teaching. In D. Holdzkom & P. Lutz (Eds.), Research within reach: science education (pp. 113-117). Washington, DC: National Institute of Education.

Lorenz, K. (1983). The Waning of Humaneness (pp. 4-7). Boston: Little, Brown & Company.

Moffitt, M. W. (1984). Children learn about science through block building. In E. Hirsch (Ed.) The Block Book (pp. 24-29). Washington, DC: National Association for the Education of Young Children.

Murphy, J. (1986, December). Growing a forest from scratch. Time, p. 65.

Myers, N. (1989, May/June). The heat is on: global warming threatens the natural world. Greenpeace, pp. 8-13.

Sankman, Q. (1986). The mini-museum of natural science. Science and children, 23, 16-17.

Shabecoff, C. (1986, September). Action is urged to save species. New York Times, p. 28.

Smith, R. (1982). Early childhood science education. In J. F. Brown (Ed.), Curriculum planning for young children (pp. 143-149). Washington, DC: National Association for the Education of Young Children.

Squires, D. A., Huitt, W. G. & Segars, J. K. (1981) Improving classrooms and schools: what's important. Educational Leadership, 39, 174-179.

Thelen, J. N. (1984). Improving reading in science (pp. 12-42) Newark, DE: International Reading Association.

Van der Post, L. (1984, Summer). Wilderness: a way of truth. Our Earth, p. 6.

Welch, W. (undated). A science-based approach to science learning. In D. Holdzkom and P. Lutz (Eds.), Research within reach: science education. (p. 167). Washington, DC: National Institute of Education.

Woodwell, G. M., Hobbie, J. E., Houghton, R. A., Melillo, J. M., Moore, B., Peterson, B. J. & Shaver, G. R. (1983). Global deforestation: contribution to atmospheric carbon dioxide. Science, 222, 1081-1085.

Yager, R. E. & Penick, J. E. (1984). What students say about science teaching and science teachers. Science Education 68, 143-152.

# APPENDIX A

# LOWER SCHOOL SCIENCE PROGRAM

# SCIENCE AND HEALTH IN THE LOWER SCHOOL

The objective of science in the Lower School is to teach each student how to make intelligent and accurate observations of the world around him.

The goal of the health program is to increase each student's knowledge of his physical growth and to develop his self-awareness.

To attain the objectives of the health and science programs many methods are used including experimentation, taking field trips, doing research and involving the resources of the Upland campus and the community. The fourth and fifth grades, in addition use basic texts.

## Grade One

The year is devoted to the study of animals stressing basic needs and differences.

1. Mammals
2. Fish
3. Amphibians
4. Reptiles
5. Birds
6. Insects

Materials used:

Films
Filmstrips
Library books

Field trips:

The Delaware Museum of Natural History
The Philadelphia Zoo
Philadelphia Academy of Natural Sciences

## Grade Two

I. Body Awareness

A. Children are introduced to the major body systems and their functions.

1. skeletal
2. muscular
3. digestive
4. urinary
5. respiratory

B. Emphasis on circulatory and digestive systems.

1. blood function
2. how food gets to all parts of the body

C. Children become familiar with major internal organs and their function.

Follow up

1. Children draw self "body" portraits (trace one another); illustrate internal organs studied and label.

2. Visit from community resource person

Registered radiologic technologist from Wilmington Medical Center visits classroom. She brings a model of a heart for further explanation of heart and blood function; also, a variety of X-rays for children's viewing and discussion.

II. **Earth, Sun, Moon**

A. The relationship of earth, sun and moon in the solar system.

1. Names of all planets and discussion of their size
2. Importance of moon and sun to earth.

a. effect on climate
b. effect on food
c. orbit
d. axis
e. day-night

3. Comparison of moon and sun.

B. Activity

1. make moon calendar
2. construct space ship

III. **Clouds**

A. Formation
B. Names/characteristics
cirrus
stratus
cumulus
nimbus
C. Clouds/weather - make rain, snow
D. Thermometer readings
E. Experiments - make rain

## Grade Three

I. **Ships and Boats**

- A. methods of powering vessels (man, wind, steam, nuclear)
- B. concepts of water displacement
- C. construction of vessels with consideration of balance, weight distribution
- D. field trip to Penn's Landing with tours of the U.S.S. Olympia and the submarine Bacuna

II. **Economics**

- A. the processes of minting coins
- B. field trip to the U.S. Mint to view coin making

III. **Wildflowers**

- A. the basic parts of plants
- B. study of pollination
- C. climate and its influence
- D. a wildflower walk in the spring

IV. **Metamorphosis**

- A. reading about metamorphosis of butterflies and frogs
- B. small group projects on:
  1. differences between butterflies and moths
  2. stages of metamorphosis
  3. species varieties

V. **Simple Machines**

- A. the basic machine
- B. construction of simple machines

VI. **Fish and Sea Animals**

- A. salt and fresh water species of fish
- B. sea mammals (whales, seals)
- C. an aquarium field trip

Grade Four

I. Foods and Nutrition

Objectives of this unit
To help students become more aware of the importance of good nutrition.

1. the food groups
2. students keep personal diet records for one week
3. movies about foods, nutrition
4. vocabulary: nutrition, saliva, digestion, and parts of the digestive system

II. Care of the teeth

Objectives of this unit
To help students learn the proper care of their teeth.

1. the structure of teeth
2. the kinds of teeth
3. students learn how to care for their teeth
4. vocabulary: enamel, dentin, pulp, plaque, cementum

Resource person: Dr. Richard L. Sklut

III. Solar System

Objectives of this unit
For students to develop an appreciation for and understanding or our solar system.

1. names of the planets
2. written and oral reports about the planets and other related topics
3. bulletin board
4. filmstrips and movies
5. field trip to planetarium
6. independent reading
7. objective test at end of the unit

IV. Pennsylvania Birds

Objectives of this unit
For students to develop an appreciation of birds and learn to identify native birds by sight and sound.

1. students do independent research and write bird reports with illustrations
2. students listen to recordings of bird calls
3. field trip

Resource people: Dr. Worth, Mrs. Robert H. Ralston
Texts: Concepts in Science Book 4, Harcourt, Brace and World
Health and Growth Book 4, Scott, Foresman and Company

## Grade Five

I. Ecology

A. Concepts
1. Forest and trees
2. Ponds
3. Swamps

B. Labs
1. Forest and trees
a. tree rings and phloem and xylem
b. photosynthesis with geranium

2. Pond
a. oxygen production in a fish tank
b. microscope and pond life

3. Swamps
a. microscope and swamp life

C. Field trips
1. Forest and trees
a. human observation
b. dissect tree
c. sawmill trip

2. Pond
a. local pond - observe food chain

3. Swamp
a. Brandywine River Museum trip

II. Chemistry

A. Concepts
1. Elements
2. Radiation

B. Labs
1. Atoms, molecules
2. Heat - contraction
3. Periodic table

III. Energy

A. Concepts
1. Fossil fuel
2. Radiation
3. Sun

B. Field trip

1. a local architect who is working with solar energy

IV. Cells

A. Concepts
1. oxidation

B. Labs
1. use a check cell under a microscope
2. study starch presence

V. Earth

A. Concepts
1. geology
2. volcanoes

B. Labs
1. fossils
2. classify rock and mineral silicon - acid

C. Field trips
1. local quarry and river to classify
a. metamorphic rock
b. pressure fold

VI. Weather

A. Concepts
1. clouds
2 climates
3. mountains
4. tides

B. Labs
1. charting weather

VII. **Architecture**

A. Concepts
1. force
2. gravity

B. Labs
1. build model truss bridge

C. Field trips
1. local barn
2. local covered bridge

VIII. **Seeds**

A. Concepts
1. flowers
2. germination
3. spores
4. reproduction

B. Labs
1. dissect tulip
2. germinate seeds
3. eat sprouts!

C. Field trips
1. mushroom farm
2. local garden

IX. **Body Systems**

A. concepts
1. circulatory system
2. digestive system
3. nervous system
4. muscular system
5. skeletal system
6. respiratory system

B. Labs
1. dissect heart
2. dissect kidney
3. dissect liver
4. dissect lung
5. dissect eye
6. construct skeletal parts

C. Field trips
1. speaker from Chester County Association for the Blind
2. participation in "Blindfold Day".

Text: Concepts In Science, Book 5, Harcourt, Brace and World

# APPENDIX B

## SCIENCE SURVEY SHEET WITH DIRECTIONS

SCIENCE SURVEY

LOWER SCHOOL

Directions:

a. Please list the major science concepts you have taught or will teach this year, 1986-87.

b. Under each concept, list the ways used to teach it, for example, the following:

Discussion.

Field trip.

Experiment.

Using texts.

Using audio-visual aids, such as movies, filmstrips or overhead projector using art projects.

Having a visiting expert.

c. Please circle the general theme to which you think the concept belongs: Space, Environments or Populations. At this time include any physical science concept under Environments.

Grade _____

Concept:

Methods of teaching:

Theme: Space Environments Populations

---

Concept:

Methods of teaching:

Theme: Space Environments Populations

# APPENDIX C

## PENNSYLVANIA ASSOCIATION OF PRIVATE ACADEMIC SCHOOLS EVALUATION

UPLAND COUNTRY DAY SCHOOL

FULL SCALE P.A.P.A.S. EVALUATION

APRIL 8-11, 1984

We commend the flow of children from classroom to library as they do research, enjoy films, and converse with the librarian and their teacher about a particular project underway. Field trips to nearby sites as well as those further away are the culminating experience for many units.

Science

The Lower School science program is well organized and implemented by each of the classroom teachers, with some review and coordination by the Director of the Lower School Studies.

The Committee commends the School:

1. For meeting its stated objectives well. The programs seem to address the children's interests and abilities
2. For the spiral repetition of some units from Grade Two through Nine
3. For using local centers and the outdoors as a classroom
4. For having a flexible schedule that allows for changes in class time and day

The Committee recommends:

1. That the Lower School continue to explore the idea of a science room for resource materials (and possibly for science classes)
2. That the faculty consider the addition of a human sexuality unit to their existing health and biology units at the Fifth Grade level

## PROGRAM: UPPER SCHOOL

The Upper School Program at Upland, including Grades Six through Nine, is well structured and reflects careful planning. The program provides for intellectual growth on a sequential basis and is designed for the needs of all students. The School offers a large number of courses in the curriculum, with many having separate levels; provision is made for wide flexibility in course offerings.

English

The Committee commends the School for a strong English program, characterized by attention to essentials such as writing, grammar, and vocabulary building, and the natural extensions of learning in the School's impressive offering in literary experiences. The diversity of faculty representation in the department encourages transfer of English skills to other content areas. The introduction of study skills at the Sixth and Seventh Grade levels is commendable and adds to the program.

The Committee wishes to commend the faculty for:

1. The department's attempt at unifying standards for written work throughout other departments as well as English

# APPENDIX D

## NOTES OF CHANGES AND ACTIVITIES IN LOWER SCHOOL PREPARED FOR THE BOARD OF DIRECTORS

lower School

Notes of Changes and new activities



**Physical Improvements**

In the Primary center there are new built-in cupboards and workstations in K-5, grade 1 and Mrs. Brigman's room. This has provided computer space and allowed for additional classroom space by eliminating some teacher desks. In addition, the shelving has provided storage for some of the blocks, math manipulatives and games, and makes for easy accessibility. (PAPAS Committee, you recall, thought we had no math manipulatives or blocks because storage was in closed cardboard boxes at the time).

**1987-88 Plans:** Plans include finishing three cupboards and adding book shelves in K-5. Needed are new teachers' desks.

**Science**

Spring In-service consisted of a needs assessment in science. A review of curriculum and a listing of science equipment indicated to faculty that science teaching in some grades is not being maximized. Lack of space, equipment and planned time for lessons were cited.

Learning experiences for science, such as classroom teaching, lab work and field trips for each grade need to be organized within a larger conceptual framework. For example, in grade 5 a unit on trees is presented. However, this unit fits within a larger basic concept of man's interdependence with nature. Metaphorically, the science curriculum in lower school presently consists of lots of wonderful trees without the realization of how they make up a forest. In other words, we need a better master plan.

**1987-88 Plans:** Plans include getting some science consultants to help faculty form the present science curriculum into a more holistic framework. Funding? Science cabin???

**Family/class outings**

While grades 4 and 5 have had in the past at least one family/school activity, such as a skiing outing, this year the involvement has carried over into academics. Grade 4 study of astronomy included a class trip to the Mt. Cuba Observatory followed by a family night at the observatory. High participation was noted. Grade 3 held a family dinner and enjoyed Mrs. Smith's slides and comments on her teaching in Zaire, Africa in conjunction with the Trip Around the World Unit. In grade five, the usual meeting was held to discuss the teaching of sex education and to review the development of children at the 10-12 age level. An innovation this year was to introduce the parents to the format and expectations of grade 6. Mrs. Schoch, Upper School Director, and Upper School teachers were available to answer questions.

# APPENDIX E

## THE LONG RANGE PLAN: ACADEMICS

B. The Program

An important principle underlying Upland's approach is the pre-eminence of the individual over the program, particularly in the early years. At the same time, it is important that Upland articulate and thoughtfully maintain a curriculum.

Upland's embrace of the 4A's (Academics, Arts, Athletics, Attitude) is the cornerstone of the school's philosophy and provides a framework for its education; it is a philosophy we endorse and to which we urge a continuing commitment. A good school must train its students to use their minds - not just to absorb and remember information but to develop the basic intellectual skills and appropriate attitudes toward learning. Students must have opportunities to be creative and to develop an aesthetic sense; they need to become aware of other times and other cultures. Good schools also develop the bodies and the characters of students in the hope that they will not only live healthy lives but that they will be caring, concerned and reponsible human beings.

Both the informal and formal curriculum should constitute a coherent whole - a set of courses and programs and policies that blend together and enable the school to accomplish its mission. Teachers should have a central role in making this curriculum; they need to understand it and its coherence and know how their subject fits into it.

From time to time it may seem that the balance of the 4A's has been upset. It will appear that athletic trips are eating into class time or that more money is being spent on art than on science supplies. While we have no specific long range recommendations on this matter, we urge the administration and faculty to be alert to this possibility and to periodically review the matter together.

i) Academics

As a general statement the basic liberal arts curriculum offered our students is appropriate and is in harmony with the school's overall mission. However, a number of questions and concerns can only be addressed by, and therefore we recommend, a comprehensive review of the curriculum to ensure a proper balance among subject areas, a cohesive Kindergarten through Grade 9 approach, the use of materials compatible with the needs of the students in different tracks, and a proper "fit" with the programs of area high schools.

While we recognize that the specific curriculum is the province of the faculty, we do believe that certain general educational principles and programs are fundamental to the School's educational philosophy and to its ability to prepare its students for the world beyond Upland.

A graduate of Upland should have a solid grounding in math and in reading, grammar, composition, communications and computer skills. In addition, we would like to see the following areas addressed: more emphasis on scientific method in the lower school; expanded health education; an introduction to other cultures of the world through history, geography and language courses, and through an acquaintance with some of the great literature and seminal ideas of world - and particularly western - history; and an expansion of environmental studies, with a special emphasis on the use of area institutions and resources (such as Stroud Water Research and New Bolton Center).

# APPENDIX F

## INITIAL LIST OF POSSIBLE FIELD EXPERIENCES

# POSSIBLE FIELD SITES

## Nature Centers

1. Brandywine Nature Center
2. Charlestown Nature Center
3. Ashland Nature Center
4. Myrick Nature Center

## Museums

1. Franklin Institute
2. Hagley Museum (Industry and Inventions)
3. Winterthur (Use of Woods)
4. Academy of Natural Sciences
5. Delaware Museum of Natural History
6. Iron Hill Museum (Indian and Ores)

## Other Sites

1. Springton Manor Farm
2. Mt. Cuba Observatory
3. New Bolton Center (Veterinary Outpost for a Large University)
4. Stroud Water Research Center
5. University Planetarium
6. Longwood Gardens
7. Weather Station in association with a local high school
8. A Farm for Miniature Horses
9. A Mushroom House
10. Philadelphia Zoo
11. Wilmington Zoo

# APPENDIX G

## PRE- AND POST-SURVEY OF AMOUNT OF TEACHING TIME FOR THE SUBJECT OF SCIENCE

Grade Level_____

SURVEY ON TIME ALLOTED FOR SCIENCE

1. Do you teach science every day?_____

2. How many science periods do you have each week?_____

3. How long is each period?_____

4. Please discuss any unusual time allotments for science, such as more time spent during a particular season._____

_____

_____

_____

_____

_____

_____

Thank you.

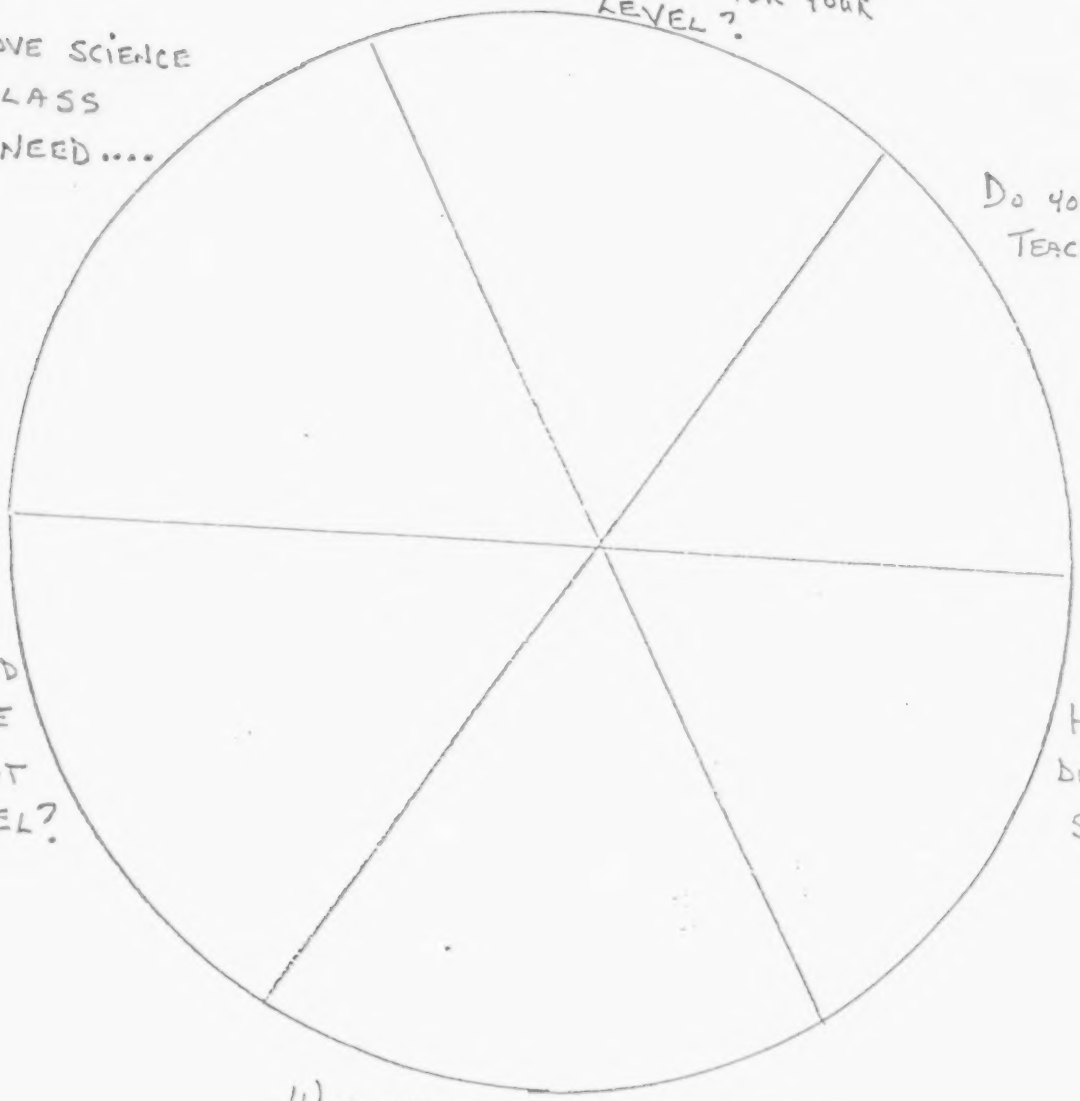
APPENDIX H

SCIENCE SURVEY FOR LOWER SCHOOL SCIENCE TEACHERS

# SCIENCE DEPARTMENT SURVEY

## "FILL IN THE PIE"

NAME _____


WHAT PROCESS SKILLS ARE APPROPRIATE FOR YOUR LEVEL?
TO IMPROVE SCIENCE IN MY CLASS I NEED....
DO YOU ENJOY TEACHING SCIENCE?
HOW COULD SCIENCE BE IMPROVED AT YOUR LEVEL?
HOW OFTEN DO YOU TEACH SCIENCE?
WITH WHAT SCIENCE SUBJECT AREAS ARE YOU MOST COMFORTABLE?

# APPENDIX I

## FACULTY SURVEY OF COMPETENCIES AND INTERESTS IN TEACHING AREAS

_____

Survey of Teaching Areas

Please rank the following areas from 1 to 5 according to where you feel you have the strongest teaching competencies.

Applied Language Arts (Spelling, Writing, English)____

Mathematics____

Reading____

Science____

Social Studies____

Please rank the following areas from 1 to 5 according to what you really like and enjoy teaching.

Applied Language Arts____

Mathematics____

Reading____

Science____

Social Studies____

# APPENDIX J

# FIELD SITE EVALUATION

Grade:_____ Date:_____

Destination:_____

Cost per pupil, if any:_____

Field experience in conjunction with the teaching of:_____

Time involved in transportation one way to the site:_____

Time involved at the site:_____

Type of experience or experiences at the site:_____

Special preparatory activities needed for this field experience:____

_____

Follow-up activities planned:_____

**********

Evaluation of the site location and site personnel

1. Did the site have restroom facilities?_____
2. Did the site have a place for lunch? _____
3. Was the site appropriate for your grade level (safety, ease of use, etc.)?_____
4. Did the site personnel handle the children with ease and in an effective manner?_____
5. Was the program presented appropriately for the class?_____
6. Would you recommend this field experience again for the same grade level?_____

Comments:

# APPENDIX K

## EVALUATION FORM FOR SCIENCE MATERIALS

Evaluation Form for Science materials

Material's Title_____

Publisher_____

Grade level of students_____

Please respond to the following items using the scale. Write additional comments if you wish.

| Strongly agree | agree | unsure | disagree | strongly disagree |
|---|---|---|---|---|
| 5 | 4 | 3 | 2 | 1 |

The material was appropriate for the grade level you are using._____

The material was easy to use._____

The material helped develop the students' process skills, such as measuring, observing, making inferences._____

The material's content was pertinent to the content of the curriculum._____

The material was enjoyable to use._____

The material was enjoyed by the children._____

Comments:_____

_____

_____

_____

_____

# APPENDIX L

## SELECTED APPROPRIATE FIELD SITES FOR SCIENCE

## Selected Appropriate Field Sites for Science

### Nature Centers

1. Myrick Nature Center
2. Ashland Nature Center

### Museums

1. Franklin Institute
2. Winterthur Museum (woods)
3. Academy of Natural Science
4. Delaware Museum of Natural History
5. Iron Hill Museum (Indians and ores)
6. Mushroom Museum

### Other Sites

1. Mt. Cuba Observatory (added a night trip)
2. Stroud Water Researach Center
3. University Planetarium
4. Longwood Gardens
5. Weather station in association with a local high school
6. A farm for miniature horses
7. A mushroom house
8. Philadelphia Zoo
9. Wilmington Zoo
10. National Aquarium at Inner Harbor

APPENDIX M

SCIENCE MAGAZINES AVAILABLE IN THE SCHOOL LIBRARY

## Science Magazines Available

Current Health

Discover (upper school)

Earth Science

Health

National Geographic

National Wildlife

Odyssey

Owl

Popular Science (upper school)

Scienceland

World

# APPENDIX N

## ADDITIONAL SCIENCE MAGAZINES TO CONSIDER FOR THE LIBRARY

## Additional Science Magazines to Consider for the Library

1. Current Science
   Field Publications
   4343 Equity drive
   Post Office Box 16630
   Columbus, OH 43216

2. Dolphin Log
   The Cousteau Society
   930 West 21 Street
   Norfolk, VA 23517

3. Chickadee Magazine
   Post Office Box 11311
   DesMoines, IA 50340

4. Kind News
   Box 362
   East Jadda, CT 06423

5. Your Own Backyard
   National Wildlife Federation
   8925 Leesburg Pike
   Vienna, VA 22180

6. Super Science Red Edition
   Scholastic
   2931 East McCarty Street
   Post Office Box 3710
   Jefferson City, MO 65102-9957

7. Super Science Blue Edition
   Scholastic
   2931 East McCarty Street
   Post Office Box 3710
   Jefferson City, MO 65102-9957

8. 3-2-1 Contact
   Post Office Box 53051
   Boulder, CO 80322-53051

9. Ranger Rick
   Membership Services
   National Wildlife Federation
   8925 Leesburg Pike
   Vienna, VA 22180-0001

# APPENDIX O

## SCIENCE INSTITUTIONS AND EDUCATORS CONTACTED FOR INFORMATION ON SCIENCE MATERIALS

## Science Institutions and Educators Contacted for Information on Science Materials

1. The science consultant for the County Intermediate Unit

   a. Recommended the Aims Program for ease of use in small areas and its relationship of mathematics.

   b. Recommended the Electric Company for free energy materials (used in Grades 4 and 5 last year).

2. Science coordinator for a school system in Delaware

   a. Discussed SAVI/SELPH materials, 9 modules of science based on a multi-sensory hands-on philosophy.

3. Co-ordinator for The Learning Tree, Office of Environmental Education, Department of Education, Harrisburg, PA

   a. Will set up a Learning Tree Workshop in the summer at the school. Project Learning Tree is an environmental education program with free guides and activities for use in multi-disciplines.

4. Director, Trees Across Delaware Valley and Global Releaf Programs under the sponsorship of Philadelphia-based arboretums

   a. Provided free Arbor Day and other information for Earth Day efforts and Grade 4 science projects on trees.

5. Director, Council of the Earth Programs at Rainbow Center

   a. Led instruction on using the Indian format for councils as they can be used in class with ecology tenets.

   b. A parent, the writer, and a teacher attended a workshop sponsored by the city zoo.

6. Educator, PA Fish Commission

   a. Directs KARE, Keystone Aquatic Resource Education. A workshop may be set up in which free materials and guides are available for teaching water resources and aquatic life forms.

7. Educator, PA Game Commission

   a. Will offer free workshop on Project WILD on wildlife educatin. (Hold in the summer)

8. National Wildlife Federation

   a. Ordered 10 books to complete the Naturescope Library.

9. Zoobooks

   a. Ordered this magazine for Grade 1 to be used in the year long study of animals.

10. Director, Non-Public School Services for the County Intermediate Unit

    a. Contact for drug education workshops. Grade 2 and 4 teachers attended. Now Grades 2 through 6 have trained teachers for the Here's Looking at the Year 2000 drug education materials.

    b. Contact for the Geography Challenge Program. A team trained to attend, but the challenge date was changed to school vacation next year.

11. National Geographic

    a. Personnel sent information on the Kids Network which resulted in its adoption.

12. Science Fair Co-ordinator for the county

    a. The writer attended the training workshop and returned with complete materials for the science curriculum committee.

13. National Aeronautics and Space Administration (NASA)

    a. Sent for SEEDS Project which will continue this spring (tomato seeds from outer space).

14. Delaware Aerospace Resource Educator, Delaware Teacher Center

    a. Contact for future teacher workshops or tour of the Goddard Space Center.

15. Lawarence Hall of Science, University of California at Berkeley

    a. Provided information on the Full Option Science System (FOSS) being developed in grades 3 through 6.

16. Local Girl Scout Teacher

    a. Resource for OBIS Science materials.

17. Representative, Encyclopedia Britannica

    a. Will send samples of the FOSS materials when needed and did send videotape.

18. The Astronomical Society of the Pacific

    a. Mails free newsletter on astronomy which is used by grade 4.

19. Earth Week Coordinator, Pennsylvania Department of Environmental Resources

    a. Provided resource book for an Earth Day classroom program with lessons on Energy and Waste, Air and Atmosphere, Water and Wetlands, Land and Land Use, Arbor Day, Clean Up and Green Up.

20. International Reading Association

    a. Provided information on science magazines.

21. Earth Day 1990, Stanford University

    a. Provided lesson plan and home survey for kindergarten through grade 6 on Energy, Solid Waste/Recycling, Toxics, and Water.

22. Southeastern County Chapter of the League of Women Voters

    a. Provided free film and handout on Hazardous Waste In The Home.

# APPENDIX P

## ADDITIONAL FIELD TRIPS USED THIS YEAR

## Additional Field Trips This Year

Kindergarten - 4-year-olds

A neighboring marsh with a boardwalk through it. Returned during each session.

Kindergarten - 5-year-olds

A nature center trip on habitats

First

No new trips added

Second

A mushroom farm

Third

1. Conservancy lands, wild flowers, with a guide
2. Nature center - seeds

Fourth

1. Nature Center - Study of trees
2. Londwood Gardens - Study of trees
3. University Planetarium (astronomy)
4. Night trip to an observatory (astronomy)

Fifth

1. National Acquarium, Inner Harbor (reproduction)
2. Crown Hardwoods (study of the Rainforest)
3. Martin Guitar Company (study of woods)

# APPENDIX Q

## SCIENCE MATERIALS PRESENTED TO LOWER SCHOOL TEACHERS

## Science Materials Presented to Lower School Teachers

1. The AIMS Materials
   AIMS Education Foundation
   Post Office Box 7766
   Fresno, CA 93747

   A set of materials for lower school which features investigations and activities relating science and mathematics.

2. Naturescope Education Library
   National Wildlife Federation
   8925 Leesburg Pke
   Vienna, VA 22180-0001

   A set of 16 books, each on a specific science topic which features activities, experiments, and information on that topic and integrates language arts and social studies.

3. Kids Network
   National Geographic Society
   Department 1001
   Washington, DC 20036

   A telecommunications program for middle grades which involves children in various geographic areas in sharing and discussing science topics of global interest (specifically Grade 5).

4. Zoobooks

   Wildlife Education
   1111Ft. Stockon Drive, Suite G
   San Diego, CA 92103

   A monthly book with facts and photographs about wildlife (specifically for Grade 1).

5. Council for The Earth Program
   Rainbow Child Center
   1705 Balsam Lane
   Villanova, PA 19085

A training workshop for teachers in which the use of the Indian Council is taught. The council format, games, and art activities are used to develop awareness for pollution problems and prevention. (Two faculty and one parent trained for this program to be used specifically for Grade 2.)

6. Birdwise

Addison-Wesley Publishing Company, Inc.
New York, NY

A book about birds which featured 40 ways of finding out information about birds. (For Grade 4)

7. The Voyage of The Mimi

Bank Street College of Education funded by the United States Department of Education (Donated by a parent)

A 13-part video with accompanying printed materials about whales. Science visits to the woods Hole Marine Biological Laboratory and other centers are featured and such concepts as maps, computers, navigation are explored. (used at fifth grade level)

8. Science Through Children's Literature: An Integrated Approach

Teacher Ideas Press
Englewood, CO

A resource book added to the library in which children's literature selections are related to three areas of science--Life Science, Earth and Space Science, and Physical Science.

9. Desktop Zoo

Microgram Publishing

A two-disk set with three activities about 120 different animals. (Used at the first and second grade level.)

# APPENDIX R

## PROPOSED SELECTED SCIENCE PROGRAMS

## Proposed Science Programs

1. Project Learning Tree

Office of Environmental Education
333 Market Street
Harrisburg, PA

Project Learning Tree is sponsored nationally by the American Forest Foundation and the Western Regional Environmental Council. This environmental education program has been used in 47 states, 5 Canadian provinces, and in Sweden.

The workshop, required before receiving materials, involves 175 activities which help with science, social studies, mathematics, language arts, and humanities. (Planned as a summer one-day workshop for a minimum of 15 people.)

2. K.A.R.E. - Keystone Aquatic Resource Education

Pennsylvania Fish Commission
Post Office Box 1673
Harrisburg, PA 17105

Teachers attend a free workshop in the water resources of PA and their aquatic life forms. Free materials are given for instruction and for stream monitering. (Possible workshop planned on campus in summer.)

3. Project WILD

Pennsylvania Game Commission
Department AR, 2001 Elmerton Avenue
Harrisburg, PA 17110-9797

This free workshop offers training and materials on wildlife education. (Possible workshop planned on campus in summer.)

4. Full Option Science System (FOSS)

Lawrence Hall of Science
University of California
Berkeley, CA 94720

Distributed by:
Britannica Educational Corporation
310 South Michigan Avenue
Chicago, IL 60604
Contact: Mike Dellefield

Materials are in trial edition now and being used at a close trail center in the state of Delaware. Next year 12 modules will be available covering the following broad topics:

Scientific Reasoning and Technology
Physical Science
Earth Sciences
Life Sciences
(Grades 3 through 6)

The program emphasizes hands-on developmentally sound activities often completed in small groups. The equipment kit and teacher's guides make the program very usable for classroom teachers.

# APPENDIX S

## POSSIBLE PARENT AND FACULTY SCIENCE RESOURCE PERSONNEL

## Parent and Faculty Resource Persons for Science

1. D. S. - Astronomy hobbyist
2. Dr. B. S. - Stream, River, and Pond Ecology
3. Dr. C. D. - Restoration of dry jungle, Costa Rica
4. G. P. - Raising organic vegetables, starts bean sprouts with groups; formerly with arboretum as science educator
5. S. Y. - Mushroom grower, gives tours
6. Dr. W. and M. M. - Miniature ponies
7. R. V. - Limnology expert
8. C. P. - Dental hygenist who does a "tooth fairy" progam
9. S. L. - Trees, wildflower expert
10. Dr. M. B. - Small animal care (veterinarian)
11. P. R. - Birds
12. S. S. - Deep sea diving, biology
13. S. dP. - Animals
14. R. B. - Australians (life/animals)
15. T. A. - Uses of wood, museum conservator
16. E. K. - Turtle expert
17. S. A. - Flower expert
18. B. F. - Seashore flora and fauna (leads trips for young people)
19. P. S. - Uses of wood; veneer factory
20. H. L. - Beekeeping, timberframing expert
21. A. H. - Nurse, works in diagnosing Aids
22. A. H. - Animal pathology, University of Pennsylvania

23. L. B. - Tropical fish

24. C. C. - Outdoors--camping, hiking

25. B. V. - Science teacher; will conduct science experiments

26. J. H. - Waste water management

27. D. N. - Academy of Natural Science, Philadelphia

28. P. H. - Orienteering; familiar with Obis science materials

29. T. B. - Outdoor survival

30. D. P. - Research lab which breaks down by testing contents of products; Ex- Betty Crocker wants to know what's in a particular competitor's cake mix

31. K. M. - Dentist

32. D. H. - Landfill, gives tours

33. S. D. - Science lab equipment company, donations to school possible

34. J. S. - glass blowing

35. C. B. - Earth Day resource person

# APPENDIX T

## THE EARTH WEEK CELEBRATION PLANS

## The Earth Week Celebration

### Assemblies

#### First

Chief Scattle's speech
Song composed by Chris Campbell and Donna Melton
Plans from each class

#### Second

Prayer of Thanksgiving (Indian) (By Grade 3)
Reports from classes

### Families

Information sheet - You can make a Difference

Video showing of Hazardous Waste at Home with handout

### Whole School

1. Recycling the lunch organized by Student Council
2. Adoption of local environmental issues by the upper grades

   (hazardous waste dumps, open space, groundwater contamination)
3. Writing letters to public officials concerning these issues (after League of Women Voters representative speaks on issues)
4. Planting a tree for Earth Day
5. Trash walk with second/third with upper school service help
6. Selected classes tour the closest landfill
7. The librarian sets up exhibit in showcase
8. Art classes make posters/banners
9. A salad bar lunch prepared by parents

Individual Projects

Primary Center (Kindergarten 4 and 5, and Grade 1)

1. Study the water cycle. Participate in Raindrop Walk, a simulation of the water cycle prepared by fifth grade in crafts class

2. First grade will cast dinosaur tracks

3. Parents read ecology books to classes

   Examples are:

   The Lorax
   The Giving Tree
   Emily and the Dinosaur

Grade 2

1. Participates in Trash Walk

2. Participates in a council of the Earth based on class study of endangered species.

Grade 3

1. Participates in Trash Walk

2. Give Indian Prayer of Thanksgiving at second Earth Assembly

3. Visit the Laurels, conservancy land area and have an ecologist speak to class (arranged by a parent)

Grade 4

1. Share the year's study of trees

2. Work on selecting and helping plant the Earth Day tree

3. Purchase a seedling to plant at home
   Count these and send figure to Global Releaf

4. Tour the Penn tree sites which are close (oak trees in the county at the arrival of William Penn in 1692)

Grade 5

1. Continue building bluebird houses and placing them

2. Build a geodesic dome

Grade 6

1. Plant and grow the NASA tomato seeds from outer space

APPENDIX U

ENVIRONMENTAL PROGRAMS
FROM THE BRANDYWINE VALLEY ASSOCIATION

THE BRANDYWINE VALLEY ASSOCIATION

1760 Unionville-Wawaset Road, West Chester, PA 19382
(215) 793-1090

# ENVIRONMENTAL EDUCATION PROGRAMS FOR SCHOOLS: ELEMENTARY SCHOOL LEVEL

## COMMON SENSE

Grades K-2
1 hour; $2.00/participant

Discover what people have in common with other animals. This seasonal walk will sharpen students observational skills while using their sense of touch, smell, hearing, taste and vision.

## FINDINGS OF FALL

Grades K-2
1 hour, available September 15-November
$2.00/participant

Discover how plants and animals prepare for the upcoming winter by making changes in the fall. Observe the beautiful variety of autumn colors, look at the adaptations of some special seeds and learn how animals plan ahead.

## SIGNS OF SPRING

Grades K-2
1 hour, available April 1 to June
$2.00/participant

Watch spring unfold as buds and wildflowers pop up, hibernators emerge from their winter shelters and activity picks up again as the days grow longer and warmer. Students will learn how plants and animals change with the season and why.

## AT HOME IN YOUR HABITAT

Grades K-3
1 hour; $2.00/participant

Search for signs of wildlife while learning the four basic components of a habitat. Students will discover a variety of animal homes and understand why those homes are appropriate.

## SIGNS OF ANIMALS IN THE WINTER LANDSCAPE

Grades K-5
1 hour, available December to March
$2.00/participant

When the leaves fall from the trees, signs of activity in the Brandywine landscape abound. Nests, birds and meadow vole tunnels, normally concealed, become easier to see, and signs of life trace the movement of the teeming Myrick Conservation Center wildlife. Habitat and adaptations, including migration and hibernation, will be discussed.

## CYCLING AND RECYCLING

Grades 3-5
1.5 hours; $3.00/participant

Explore nature's air, water and soil cycles to see how the building materials of life are used over and over again in a balanced ecosystem. When used with the lunch recycling program, students will practice recycling alternatives as they discover how our throwaway society interferes with these life sustaining systems.

## AMAZING ADAPTATIONS

Grades 3-5
1.5 hours; $3.00/participant

Observe the wonderful variety of adaptations of organisms at the Myrick Center. From the color of worms to the beaks of birds, students will learn how adaptations help plants and animals, including people, survive.

## INSPECT AN INSECT

Grades 3-5
1.5 hours, available April 15 to October 15
$3.00/participant

Insects collected in a sweep net can be fascinating! Learn the characteristics of insects and observe the similarities and differences between the various insects collected at the Myrick Center.

## SEEDS PLEASE

Grades 3-5
1.5 hours, available September 15 to November
$3.00/participant

Examine the fall bounty of hitchhikers and parachutes. Students will discuss the way seeds travel as well as the importance of seeds as food for wildlife and people. Great opportunity for classroom follow-up activities.

## TERRIFIC TREES

Grades 4-5
1.5 hours, available April 15 to October 30
$3.00/participant

Explore the terrific and complex world of trees by examining seeds, adopting trees and building a human tree! Students will learn to identify trees by their leaves using a tree identification guide. Great ideas provided to adopt-a-tree at school.

## COMMUNITIES AT WORK

Grades 4-5; 2 hours; $4.00/participant

Explore the inhabitants of a pond, stream or forest community while discovering their interactions and adaptations. For each community, students will examine the interdependency of a variety of organisms through the transfer of energy. Small groups may request which community they would like to explore. Due to physical limitations, large groups may need to be divided so that each student explores one of the three communities.

# APPENDIX V

## A NEWS RELEASE ON EARTH WEEK ACTIVITIES

DAVID C. WILSON
*Headmaster*

UPLAND
COUNTRY DAY SCHOOL

THOMAS C. SWETT
*Assistant Headmaster*

FOR IMMEDIATE RELEASE:

UPLAND COMMUNITY PREPARES TO CELEBRATE EARTH WEEK

Special assemblies and activities are currently being planned as part of Upland's observation of Earth Week. Families in the Upland community are being invited to participate in Earth Day and Earth Week activities, which include the following.

Festivities will begin with a school-wide assembly on Friday, April 20. The assembly will feature a special reading by noted illustrator, author and Upland parent, Michael Green, musical presentations and a ceremonial tree planting.

Projects planned for various grades will include some of the following. The Primary grades will study the water cycle and participate in the Raindrop walk in the Arts Building. Fifth grade Craft classes will help with the setup for the walk. Grade two will participate in a Council of the Earth based on the class study of endangered species. Grade three plans to give the Indian Thanksgiving Prayer at an assembly and also plans a visit to the Laurels for a picnic and a visit from an ecologist. Grade four will study trees and will work with science teacher, Bud Rockey on selecting and preparing a site for the Earth Day tree. Grade five will be building bluebird houses and possibly a geodesic dome. Grade six will be working with seeds received from NASA that have been returned from Outer Space.

Some other Upper School activities will include: Student Council will organize recycling in the lunchroom; upper grades will adopt a local environmental issue and write to officials concerning it; Margaret Walton who is the Southern Chester County League of Women Voters Action Chair will be coming to discuss issues with the students; some classes will tour the SECCRA landfill; banners and posters are being made in Art classes.

Parents are also invited and encouraged to participate in the activities. In addition, they will have the opportunity to view a "Hazardous Waste at Home" video at various times during the week. Plans are also being made to have a Salad Bar one day at lunchtime. Parents will prepare and serve the meal which will include bean sprouts grown by the students.

For further information, contact:
Jo Melody or Donna Melton
(215) 444-3035



420 WEST STREET ROAD • KENNETT SQUARE, PA 19348 • 215-444-3035

END

U.S. Dept. of Education

Office of Education
Research and
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Date Filmed

March 29, 1991